

LETTERS

Comment on “Examining the Scientific Consensus on Climate Change”

PAGE 233

In a summary of their survey on the opinion about global warming among Earth scientists (see *Eos*, 90(3), 20 January 2009), Peter Doran and Maggie Kendall Zimmerman conclude that the debate on the role of human activity is largely nonexistent, and that the challenge is “how to effectively communicate this fact to policy makers” and to the public.

However, I argue that neither of these conclusions can be drawn from the survey. For example, one issue that is much discussed in the public debate is the role of greenhouse gas emissions in global warming. Perhaps there is not much debate about this issue among scientists, but this cannot be concluded from the survey, in which nothing is said about such emissions. In the second question of their

survey, Doran and Kendall Zimmerman refer only to “human activity.” Furthermore, even if scientists agree that the effect of human activity is “significant,” which is the word used in the second question, they can have very different beliefs as to how large, and how dangerous, this effect is.

Therefore, it is incorrect to conclude that there are no differences between the scientists. It cannot be excluded that there are such differences, which are highly relevant for the public debate on climate policy. This is so, even if the problems related to the low-participant survey’s low response rate (30.7%) are ignored.

—ROLAND GRANQVIST, Department of Economics and Social Sciences, Dalarna University, Borlänge, Sweden; E-mail: rgr@du.se

Further Comment on “Examining the Scientific Consensus on Climate Change”

PAGE 233

The feature article “Examining the scientific consensus on climate change,” by Peter Doran and Maggie Kendall Zimmerman (see *Eos*, 90(3), 20 January 2009), while interesting, has a primary flaw that calls their interpretation into question. In their opening sentence, the authors state that on the basis of polling data, “47% [of Americans] think climate scientists agree... that human activities are a major cause of that [global] warming...” They then described the two-question survey they had posed to a large group of Earth scientists and scientifically literate (I presume) people in related fields. While the polled group is important, in any poll the questions are critical. My point revolves around their question 2, to wit, “Do you think human activity is a significant contributing factor in changing mean global temperatures?” Note that the opening sentence of their article uses the phrase “major cause” in reporting the results of the polling,

while the poll itself used the phrase “significant contributing factor.” There is a large difference between these two phrases.

I may or may not think that human activities are a “major cause” of global warming, but in either case, I might be of the opinion that human activities are a “significant contributing factor” to such warming. While the term “major cause” has some subjectivity to it, “significant contributing factor” can mean just about anything. I might think (or even know) that the major cause of some phenomenon is process X, but process Y contributes to it at the 20% level. To me, that 20% could constitute a significant contribution. So the use of the subjective phrase “significant contributing factor” does not give the authors the information they interpret that the poll is giving them, since they have no way of knowing how any individual respondent would interpret the phrase in question.

In their poll, if the authors had directly asked the question, “Do you think human

activity is the major (or better yet, predominant) cause of changing mean global temperatures?” then they would have results worthy of analysis along the lines that they applied. While the first question in the survey was decidedly direct (“...do you think mean global temperatures have generally risen, fallen, or remained relatively constant?”), the second question was not up to the same standard. If the debate that the authors refer to in their article is whether or not human activities are the major cause of global warming, their poll does not show that the debate does not exist (it may or may not, in fact, exist, but their poll does not show either outcome). If the debate is whether or not human activities contribute significantly (whatever that means) to global warming, then the authors are correct in their conclusion. I submit that the two potential debates are different. (Disclaimer: I was not solicited as a poll participant, to the best of my knowledge.)

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Reply to Comments on “Examining the Scientific Consensus on Climate Change”

PAGE 233

Roland Granqvist’s main concern with our study is that it did not include more specific questions about the causes and severity of global warming. In fact, our *Eos* article presented a snapshot of the full study [Kendall Zimmerman, 2008] in which we did ask about causes of warming, and

in which we also explained that the survey was designed to have only a few key questions in order to maximize response. Granqvist also questioned our response rate, but as we explained in the report (with references), our response rate is typical for this type of survey. We actually were thrilled to receive more than 3000 responses, given that scientists are generally very busy. We

also did not claim “there are no differences between the scientists.” Our data clearly show some differences, especially across subdisciplines, and we concluded there was “largely” no debate among the scientists most qualified to have an informed opinion on the topic.

John Helsdon points out that the public opinion poll cited uses the word “major” to describe human influence on climate, and that our poll uses the word “significant.” Our survey was developed before the public poll was published, so we did not have a chance to match wording; however, *Kendall*

Zimmerman [2008] cites other public polls with different adjectives (e.g., large) and similar results. In fact, "major" and "significant" are synonyms. The Merriam-Webster Dictionary definition of "major" includes "significant in size" (<http://www.merriam-webster.com>). We believe our conclusion remains correct, but even if respondents viewed question 2 as implying a lesser involvement of humans than if we used "major,"

the negative response to the question by Helsdon's fellow meteorologists becomes even more outstanding, and the differences between them and the active research climatologists remain interesting.

Finally, Helsdon is listed in the AGI database and so we confirm that he was sent an invitation, as well as two follow-up reminders, to participate. Maximizing participation is clearly difficult.

Reference

Kendall Zimmerman, M. (2008), The consensus on the consensus: An opinion survey of Earth scientists on global climate change, M.S. thesis, 250 pp., Univ. of Ill. at Chicago, Chicago.

—PETER T. DORAN and MAGGIE KENDALL ZIMMERMAN, Earth and Environmental Sciences, University of Illinois at Chicago; E-mail: pdoran@uic.edu

ABOUT AGU

Kastens Receives 2009 Excellence in Geophysical Education Award

Kim Anne Kastens received the Excellence in Geophysical Education Award at the Joint Assembly, held 26 May 2009 in Toronto, Ontario, Canada. The award honors "a sustained commitment to excellence in geophysical education by a team, individual, or group."

PAGES 233–234

Citation

We honor Kim Anne Kastens this year for pioneering work educating journalists about the geosciences; for playing a foundational role in establishing geoscience learning as a field of research; and for her work with teachers and teaching materials to improve geoscience education.

Kim began her work in geoscience education a little more than 15 years ago, a time when widespread interest in education among geoscientists was just around the corner. We understood the importance of our public face and were working hard within our professional societies to improve the ability of geoscientists to talk to the media. In a move that demonstrates her characteristic blend of creativity and practical insight, Kim imagined how we could use courses for journalists to improve this communication. In collaboration with the Columbia University Graduate School of Journalism, she established a program in Earth and environmental sciences journalism that complements our efforts to learn to talk to the public, by preparing journalists to be ready to talk to us. Graduates of this program can be found writing for such publications as *Wall Street Journal*, *New York Times*, *Earth* (formerly *Geotimes*), *Audubon Magazine*, *Caijing* magazine in China, *Scientific American*, and even our own *Eos*.

Kim was a marine geologist for 15 years before she was a geoscience educator. It should be no surprise that with this background, as she turned her attention to education she started to explore scientifically the challenges that students face in learning geoscience, particularly in visualizing geoscience

features and data. This approach led her into collaborations with cognitive scientists. She was one of the first people in our community to understand the relevance of cognitive science research to geoscience education and the need for research into those aspects of learning that are particularly important in geoscience. Bringing together her understanding of the nature of geoscience thinking and their understanding of the workings of the mind, she and her collaborators took on questions such as how children learn to read and interpret maps, how climate forecast maps are understood by policy makers (and the misconceptions that arise), and how experts (geoscientists) and novices (students) visualize geologic structures.

Recognizing the value of this research and the importance of its results, Kim worked hard to encourage others to engage in this type of work. She has participated extensively in workshops, sessions, and conferences that bring together geoscientists, cognitive scientists, and educators; encouraged her colleagues in cognitive science to engage with geoscientists; and written a string of articles aimed at providing the information that geoscientists need to make use of cognitive science, and that cognitive scientists need to research geoscience. Through these efforts, Kim has been instrumental in catalyzing a new field of research, geoscience learning research. The success of this effort, by Kim and others, can be measured by looking at the growing range of offerings each year at AGU meetings addressing aspects of geoscience thinking and learning.

New research, however, is not enough to transform geoscience education. Bringing research results into widespread use is as challenging in geoscience education



Kim Anne Kastens

as it is in other parts of our field. Here, too, Kim has been a pioneer, working with a variety of different strategies. The results of her map study were incorporated into the educational software product *Where Are We?*, which has been shown to improve students' map-reading skills. Her course "Teaching and Learning Concepts in Earth Science" brings these results to students obtaining advanced degrees in geoscience or teaching. Kim has also worked directly with geoscience researchers to bring her understanding of educational theory to the development of teaching activities where students extract insights about the Earth from geoscience data. Reaching even more broadly, Kim developed a community-based system for evaluating and annotating teaching materials for use in geoscience education digital libraries.

In sum, Kim models the ways in which the creativity and rigor that come from the study of geoscience can be applied to geoscience education, from conceptualization and experimental design to the practicalities of implementation and convincing your colleagues of what you have learned. We congratulate her on her accomplishments to date and on being the recipient of the 2009 AGU Excellence in Geophysical Education Award.

—CATHRYN A. MANDUCA, Carleton College, Northfield, Minn.

Response

Thank you very much to the American Geophysical Union for the recognition